3/PRTS

METHOD OF TELECOMMUNICATION BETWEEN AT LEAST ONE MAIN STATION AND ONE TERMINAL, AND MATCHING DEVICE THEREFOR

Background Information

The present invention relates to a method of telecommunication between at least one main station and one terminal, and to a matching device therefor, according to the species defined in the independent claims.

Methods of telecommunication between one main station and one terminal are already known.

In the so-called Internet e-mail Service, messages are created by a so-called mail client and are transmitted via the Internet to a mail server of a recipient using the so-called SMTP (simple mail transfer protocol) according to RFC 821 (request for command) of the IETF (Internet Engineering Task Force), or using the ESMTP (enhanced simple mail transfer protocol) according to RFC 1869 of the IETF. The recipient can access the transmitted message from the mail server, also with the aid of a mail client. Appropriate protocols are used for access to the transmitted message, for instance, POP (post office protocol) according to RFC 1729 of IETF, or IMAP (Internet message access protocol) according to RFC 2060 of IETF, or even protocols specific to manufacturers. These protocols regulate the exchange of messages between the recipient and the mail server, such as, for instance, the logging on of a mail client to the mail server, authentication of the mail client, etc. For transmission of messages from mail server to mail client, mostly SMTP or ESMTP are used. In order to register new messages on the mail server, the mail

client checks the mail server sporadically or regularly. This procedure is also denoted as polling. If the mail client in this manner detects messages present on the mail server for the user of the mail client, it signals this to the user. The user can then initiate access to the message stored for him on the mail server. The initiation of access is also called pull mode. The message is then transmitted from mail server to mail client and can be reproduced there for the user. The method described here is intended essentially for dedicated connections, where the mail client has a permanent connection to the e-mail server, or a connection with relatively brief interruptions. SMTP was originally provided for text messages, By the use of MIME (multipurpose Internet mail extensions) according to RFC 1521 of IETF, such messages can be expanded by attachments. In this connection, the attachments can have any format desired, and are not limited to text messages. However, for transmission, these messages are recoded so that they can also be transmitted in the form of simple text messages.

The SMS service (short message service) according to the GSM standard (global system for mobile communications), GSM 03.40 ETSI differs fundamentally from the internet e-mail service described. It is limited exclusively to text messages having a maximum length of 160 characters, there being (the possibility of) expansions by concatenation of a plurality of such text messages. The SMS service is further based on transmitting the text message from an SMS transmitter to an SMS server, which then automatically transmits it to a mobile terminal. This method is also denoted as push mode. If the mobile terminal in the mobile radio network is not available, for instance, because it is switched off, the message is stored temporarily in the SMS server. Following that, when the mobile terminal can be reached again, this is signaled to the SMS server, and it automatically begins transmission of the text message to the mobile terminal.

Summary of the Invention

The method according to the present invention and the matching device according to the present invention, having the features of the independent claims, by contrast, have the advantage that the message exchange by a matching device between the at least one main station and the terminal is controlled in dependence on at least one input from the terminal or from the at least one main station. The use of the matching device makes possible the matching of main stations or servers of various services to one terminal, without having to establish a direct connection between the terminal and each respective main station, and without its being necessary to transmit between terminal and each respective main station service-specific protocols and thus different protocols depending on the particular main station involved. On account of the method according to the present invention and the matching device according to the present invention, the respective main station is not visible to the terminal, but only the matching device. Thus, various services for message exchange between terminal and various main stations may be integrated by the matching device, so that a uniform message exchange between the terminal and the matching device becomes possible for the implementation of various services. In both the case where only one single main station is connected to the matching device and the case where a plurality of main stations are connected to the matching device, the advantage may be effected that the matching device can match the message exchange between each respective main station and the terminal to inputs from the user of the terminal, to the properties and capability of the terminal or to inputs from the respective main station. In this way, the message exchange can be individually and flexibly optimized in dependence upon user inputs or equipment properties for each connection to be established between a main station and a terminal.

By the use of the matching device, service-specific features

for the message exchange between the terminal and the respective main station are cancelled out and replaced by user-specific features, which, for transmission of messages to the terminal, may be defined by an input from the terminal, or rather, the user of the terminal.

By the measures described in the dependent claims, advantageous further developments and improvements of the method for transmitting messages between at least one main station and one terminal and the matching device according to the independent claims are possible.

Thus, for example, in an advantageous manner, a transmitting mode independent of the service used may be input by the user of the terminal, so that by means of the matching device, for example, even in SMS service a pull mode can be realized, and in Internet e-mail service a push mode can be realized.

It is particularly advantageous that a plurality of messages, particularly from different main stations, are transmitted jointly by the matching device to the terminal in different modes. In this manner, clarity upon receipt of the messages is enhanced for the user, and it avoids having to activate the terminal several times for receiving messages from various main stations.

A further advantage is that the matching device segments individual parts of a message which includes a plurality of elements and processes them, depending upon the input from the terminal. In this manner, automatic, user-individual preprocessing of such messages can be implemented which requires no input from the user at the terminal, as long as the input for processing of such messages is not to be changed.

It is also particularly advantageous that a plurality of different data records can be input by a user of the terminal

for various functionalities implementable using the terminal, and can be stored in a storage device assigned to the matching device. In this way, one can match the message exchange between each main station and the terminal to the properties and the capability of various terminal configurations via the matching device. Because of the storage of the data records in the storage device, they do not have to be transmitted each time a connection is established between the terminal and the matching device, but only have to be selected in the storage device, which saves transmitting capacity.

It is also of advantage that the terminal user selects a data record; that the terminal transmits the characterizing identification character of the selected data record to the matching device; that a check is performed in the matching device, whether a data record having the identifying character received is stored in the storage device; and that, if the data record associated with the identifying character received is present in the storage device, then this data record is selected. In this manner, only the appropriate identifying character has to be transmitted from the terminal to the matching device for the selection of the desired data record, so that the data volume required to be transmitted for the selection of the desired data record is minimized, and the transmitting capacity is impaired as little as possible.

It is of particular advantage that the data records are numbered in the sequence in which they are stored in the storage device, the identifying character of the data records being formed in each case from this numbering. This provides a very simple and not very costly possibility to form identifying characters, the identifying characters thus formed being in each case formed as a number, and therefore requiring an especially low quantity of transmitting capacity for their transmission.

Brief Description of the Drawings

An exemplary embodiment of the present invention is represented in the drawings and explained in detail in the following description. The Figures show:

Figure 1 a schematic representation of an integration of various information networks for an integrated multimedia message service.

Figure 2 a block diagram of a matching device according to the present invention for carrying out the method according to the present invention.

Figure 3 a representation of the protocol layers in general form required for the message exchange according to the present invention.

Figure 4 the protocol layers for the message exchange according to the present invention in a first special embodiment.

Figure 5 the protocol layers for the message exchange according to the present invention in a second special embodiment.

Figure 6 the protocol layers for the message exchange according to the present invention in a third special embodiment.

Description of the Exemplary Embodiment

Within the framework of standardization of UMTS (universal mobile telecommunications system) a multimedia messaging system (MMS) has currently been specified according to publication "Multimedia Messaging Service , Functional Description", 3GPP TS 23.140, v.0.1.0., 3GPP Technical Subgroup Terminals 1999-10. MMS is a service which, starting from today's SMS service in GSM (SMS: short message service;

GSM: global system for mobile communications) is supposed to make possible sending and receiving of messages using, for example, a terminal 5 formed as a mobile phone.

Today's SMS service is limited to a maximum of 160 characters per message, and only text can be transmitted, that is, there exists a limited character set that can be used.

In contrast to an SMS, an MM (multimedia message) is not to be limited either to a certain length or to text representation. Instead, MM is supposed to support multiple media types.

In the MMS service, a matching device denoted as MMS relay has a central function. This element may be connected, via media of the greatest difference, to different kinds of main stations 1, 2, 3 denoted as servers or service providers, such as an e-mail server, fax server, voice mailbox, MMS server or the like, as shown in Figure 2. Its purpose is to make accessible to the user of terminal 5 all such information/messages as are present on the servers named.

Thus, via MMS relay 15, the user of terminal 5 has access to his e-mails lying in an e-mail server, to faxes "waiting" for him on a fax server, and to voice messages recorded for him on a voice mailbox.

Aside from the receipt of messages, however, it is also intended that the user be able to write messages and send these to the desired recipient via MMS relay 15.

Figure 1 shows schematically an MMSE (multimedia messaging service environment), such as can be provided, for example, for mobile radio systems according to the UMTS standard (universal mobile telecommunications system) or according to the GSM standard (global system for mobile communications). In this connection, MMSE represents a system in which new and existing services such as mobile radio telephony, fixed

network telephony, Internet and the like are integrated, and the separation, existing up to now, of the individual services within the various networks has been lifted. Furthermore, the mobile radio telephony service in Figure 1 is shown as two mobile radio networks, each denoted as a "cellular network". The fixed network telephone service is shown in Figure 1 as fixed network, and characterized by the term "fixed network". Internet service is shown and denoted as Internet in Figure 1. According to the example as in Figure 1, the MMSE here incorporates all the networks or services shown. In addition, the MMSE includes various service elements which may be flexibly implemented in any of the networks shown.

Matching device 15 as in Figure 2, already mentioned, is such a service element. Matching device 15 includes a control unit 30, to which a storage device 25 is connected. Furthermore, a fourth interface 20 to a terminal 5 is connected to control unit 30, fourth interface 20, for instance, being perhaps an air interface or a wireless interface, and terminal 5 being perhaps a mobile terminal, for instance, in the form of a mobile phone. The exchange of data between terminal 5 and fourth interface 20 takes place over a telecommunications network 10, which may be designed as a mobile radio network, if fourth interface 20 is a wireless interface and terminal 5 is a mobile terminal. But it can also be provided that telecommunications network 10 is a fixed network, and that terminal 5 as well as fourth interface 20 are wire-bound. In the following, however, there is described as an example the case in which fourth interface 20 is wireless and terminal 5 is mobile.

In addition, a first interface 11, a second interface 12 and a third interface 13 are connected to control unit 30. A first main station 1 is connected to matching device 15 via first interface 11. A second main station 2 is connected to matching device 15 via second interface 12. A third main station 3 is connected to matching device 15 via third interface 13.

In this connection, each of main stations 1, 2, 3 provides one or more services. The services provided by main stations 1, 2, 3 thus differ from one another in the exemplary embodiment described here. Now, in order to be able to take advantage of a service from one of main stations 1, 2, 3, terminal 5 does not have to establish in each case a service-specific connection to the appropriate main station. Rather, terminal 5 establishes a connection to matching device 15, for each service to be taken advantage of, and it converts the various services of main stations 1, 2, 3 into a uniform style for terminal 5. This uniform style can be input by terminal 5 or rather the user of terminal 5, and can be transmitted by terminal in the form of a data record via telecommunications network 10 to matching device 15, and stored in storage device 25.

In the following, let first main station 1 be provided, for example, for an electronic postal service, such as e-mail. Let second main terminal 2 be provided, for instance, for an SMS service. Let third main station 3 be provided, for instance, for a fax mail service. Now, for example, let the input from terminal 5 be stored in storage device 25, that messages from matching device 15 to terminal 5 are to be transmitted in the form of SMS messages. In another embodiment, in a corresponding manner in the opposite direction, SMS messages in the form of e-mail could also be transmitted by matching device 15 to terminal 5. Furthermore, the input of terminal 5 stored in storage device 25 may provide that the messages are transmitted in the pull mode described from matching device 15 to terminal 5, that means, then, only at the prompting of terminal 5. A message received in first main station 1 for terminal 5 is recognized by control device 30, on account of appropriate signalling from first main station 1. Subsequently, matching device 15 signals terminal 5 via telecommunications network 10 that there is a message for terminal 5 in first main station 1. By sending an appropriate prompting signal via telecommunications network 10, terminal 5

can thereafter prompt matching device 15 to transmit the message present in first main station 1. At the detection of this prompting signal, control unit 30 induces first main station 1 to transmit the message present for terminal 5. If, for example, this message is present as e-mail, control unit 30 recognizes this. According to the input from terminal 5 stored in storage device 25, control unit 30 converts the e-mail message to one or more SMS messages, depending on the length of the e-mail message. This SMS message or these SMS messages may, as necessary, also be stored temporarily in storage device 25 via telecommunications network 10, when terminal 5 is temporarily inaccessible. Transmission of the SMS message or of the SMS messages by matching device 15 to terminal 5 then takes place when terminal 5 is accessible, and, as described, on the assumption that the prompting signal was detected by control unit 30.

In a corresponding manner, control device 30 converts a fax message received by third main station 3 via third interface 13 to one or more SMS messages, and sends these, after prompting by terminal 5, via fourth interface 20 and telecommunications network 10 to terminal 5.

An SMS message received at matching device 15 from second main station 2 via second interface 12 is recognized as such by control unit 30, and thus does not need to be converted, but may, after prompting by terminal 5, be transmitted, in the pull mode described, via fourth interface 20 and telecommunications network 10 to terminal 5.

In corresponding fashion, control device 30 may recognize messages that were received from terminal 5 via telecommunications network 10 and fourth interface 20 at matching device 15, and convert them, according to an input from a main station addressed by these messages, to a format requested by this main station and transmit them to this main station, e.g. text to voice mail or text to fax. In this

connection, the inputs made by the respective main stations may also be stored in storage device 25. The inputs of a plurality of main stations may also be stored there.

With the aid of Figure 3, the present invention is represented at the protocol level and described in greater detail. Here, Terminal 5 is also denoted as MMS client (multimedia message service). According to Figure 3 and as described, matching device 15 is also denoted as MMS relay. In Figure 3, for example, first main station 1, also denoted as MMS server, is supposed to be connected to matching device 15. Fourth interface 20 as an air interface between terminal 5 and matching device 15 is denoted in Figure 3 as U_u. First interface 11 for connecting first main station 1 to matching device 15 is denoted in Figure 3 as IP interface (internet protocol). Matching device 15 and first main station 1, which was selected in this example to substitute for all main stations connected to matching device 15, form the described MMSE, in this connection.

The MMS server and MMS relay 15 do not necessarily have to be separated from each other as illustrated in Figure 3, but may also form one physical unit. Separation of MMS relay 15 and MMS server according to Figure 3, or a distributed arrangement of the two elements is particularly sensible if, in the case of the MMS server, and Internet e-mail server is involved. In this case, MMS relay 15 and the MMS server are connected to each other via the usual protocol layers. In this connection, MMS relay 15, on the side of air interface U_u, includes a first protocol layer sequence which corresponds to the protocol layer sequence of terminal 5. Furthermore, MMS relay 15 includes a second protocol layer sequence on the side of the IP interface, which corresponds to the protocol layer sequence of first main station 1. In this context, as MM transfer protocol (multimedia messaging) an upper protocol layer is generally denoted, which, for example, may designed as SMTP or ESMTP or even in a manufacturer-specific manner. Here, the MM

transfer protocol on the side of air interface U_u can differ from MM transfer protocol on the side of the IP interface. The MM transfer protocol on the side of air interface U_u is therefore characterized by I in Figure 3, and the MM transfer protocol on the side of the IP interface is characterized by II, in order to take account of this circumstance. In this connection, for example, MM transfer protocol II may be developed as an SMTP and MM transfer protocol I may be developed for transmission of SMS messages, in order to realize the application described in Figure 2. On the side of the IP interface, the upper layer is subdivided into MM transfer protocol II and TCP/UDP (transmission control protocol/user datagram protocol). The lower layer is generally denoted as lower layer, and is used for developing and establishing a connection between matching device 15 and terminal 5 on the one hand, as well as between matching device 15 and the respective main station on the other hand, and is also adapted to the type of messages to be transmitted via the appropriate interface. So, for example, the lower layer assigned to the IP interface according to Figure 3 is developed as an IP (Internet protocol) and the lower layer lying below it.

In this context, MMS relay 15 carries out a matching of the message exchange between the MMS server and the MMS client. In this context, for one message which is to be sent from the MMS server to the MMS client, the second protocol layer sequence 40 of MMS relay 15 is run through from bottom to top. Subsequently a change of form of the message takes place in MMS relay 15, according to the input of terminal 5. Thereafter the message thus changed in form runs through the first protocol layer sequence 35 of MMS relay 15, assigned to air interface U_u, from top to bottom, so that the message can be dispatched to the MMS client. The protocol and message conversion runs correspondingly in the opposite direction for messages to be transmitted from MMS client via MMS relay 15 to MMS server. The protocol layer sequence of second main station

2 and third main station 3 can each be distinguished the protocol layer sequence of first main station 1 as in Figure 3, second interface 12 and third interface 13 having then assigned to them in each case their own second protocol layer sequence 40, on the side of MMS relay 15, which corresponds to the protocol layer sequence of the connected main station. In this way, by use of first interface 11, second interface 12, and third interface 13, three different protocol layer sequences can be implemented on the part of MMS relay 15, each corresponding the protocol layer sequence of the connected main station. In the system described as in Figure 3, it is essential that the MMS client communicate with one or more MMS servers via MMS relay 15, and vice versa. In this connection, the structure illustrated permits, on the one hand, a flexible integration of a plurality of different MMS servers or main stations from different networks, or for different services, as for example a fax service or a voice mail service which are implemented on a cellular mobile radio network, and an e-mail service which is implemented via the Internet. By the use of matching device 15, terminal 5, if it is developed as a mobile radio device, for instance according to the GSM standard, may be offered, additionally to the implementation of mobile radio-specific functions such as SMS service, the use of standardized mail services, such as ones according to the Internet standard of IETF along with the protocols, methods and MMS servers required for this.

The functions to be carried out by MMS relay 15 may be subdivided into several groups. A first group of such functions makes possible the integration of different services or different MMS servers by matching device 15. The MMS servers of different services, such as e-mail, voice mail or fax send their messages via MMS relay 15, which converts these messages into the same form, to terminal 5. In this case it may be necessary to convert different data formats, such as fax format to graphics format. However, it may also be necessary, additionally or alternatively, to convert the data

type of such a message, for instance, to transcribe a text message into a voice mail message, so that the text message may be reproduced acoustically at terminal 5.

A second group of functions in MMS relay 15 is necessary for determining whether terminal 5 can be reached by matching device 15 via telecommunications network 10. For this it is neccesary for MMS relay 15 to have a connection to a further message element, such as an HLR (home location register), in order to receive information as to whether terminal 5 is logged on or available in telecommunications network 10. If the respective terminal 5 cannot be reached, the message to be communicated must be stored in storage device 25. As soon as terminal 5 may be reached again, and MMS relay 15 finds this out via the described network element, MMS relay 15 automatically continues the communicating process previously broken off by storing the message.

A third group of functions relates to the transmission mode to be set for transmitting messages from matching device 15 to terminal 5. Here, it should be possible, on the one hand, to transmit messages directly from matching device 15 to terminal 5 in push mode. On the other hand, it should be possible for terminal 5 only to be informed by matching device 15 that a message for terminal 5 is stored in matching device 15 or in one of associated main stations 1, 2, 3. These messages may then be retrieved at terminal 5 via matching device 15 or can be passed on to another mail system. This transmission mode corresponds to the pull mode described. The user of terminal 5 can preselect by a data record which transmission mode is used for which message or which data type of message, and he can send this data record to matching device 15 for storage in storage device 25. Such a data record is also described as a profile. When MMS relay 15 recognizes the receipt of a new message for terminal 5 in one of main stations 1, 2, 3, or when this is signaled to MMS relay 15 by one of main stations 1, 2, 3, MMS relay 15 checks, in dependence upon the profile

inputs stored in storage device 25, in which transmission mode the message is to be transmitted to terminal 5, such as whether in push or in pull mode. In accordance with the input transmission mode, the transmission of the message to terminal 5 is then controlled by control device 30.

A further group of functions of matching device 15 relates to segmenting or combining messages. Messages may be composed of several elements, such as e-mail, which can have different attachments. MMS relay 15 can treat each element of a message individually, that is, under certain circumstances it may pass on individual elements of the message to terminal 5, store others in storage device 25, cancel yet others, or send them on to another mail system. This method is denoted as segmentation of messages. Correspondingly, a message may be newly combined, for example, from message elements from different main stations 1, 2, 3. Here, for instance, all new elements input into main stations 1, 2, 3 which are to be transmitted to terminal 5 in push mode, and all new elements input into main stations 1, 2, 3 which are to be transmitted to terminal 5 in pull mode are combined, in each case, and are transmitted in the respective transmission mode to terminal 5. All message elements which are supposed to be sent to the same address, for instance, passed on in a different mail system, may be combined into a single message and passed on to this mail system. Now, whether messages from different main stations should be combined to a common message, if they are to be transmitted to terminal 5 using the same transmission mode, may also be specified in a user-defined profile. The same goes for segmentation of a message of several message elements which was received from a single main station for terminal 5. In this context, it may be specified by the user of terminal 5, with the aid of a profile, which data types or data formats of message elements of such a message are to be treated individually in which of the described forms. For example, all message elements in a video format could be passed on to another terminal in another mail system which is

in a position to reproduce the video data. Message elements having text messages can be provided in this example, for dispatching to terminal 5 according to profiles, and message elements in fax form could be provided according to profiles, in this example, for storage in storage device 25 for later retrieval.

A message for terminal 5, input in a respective manner, for example, in first main station 1, having such attachments or message elements, is then segmented according to the specifications in the user-defined profile stored in storage device 25, in order to be able to process the individual message elements of this message according to the specifications of the profile as described.

In general, the user-defined profile is a data record which is determined by the user of terminal 5 and stored in storage device 25 of MMS relay 15. It determines the behavior of MMS relay 15 and specifies which messages or message elements are transmitted directly or after retrieval, i.e. in push or pull mode, to terminal 5, which messages or message elements are automatically passed on to another mail system or cancelled, which messages or message elements are converted to another format, etc. In order to be able to carry out the processing provided with the aid of profiles for the messages or message elements, these messages or message elements must be able to be differentiated from one another and identified. Differentiating features for identifying the messages or message elements are, for example, data type, that is, fax, voice mail, e-mail, SMS, etc, and the length of the messages or the message elements. In this connection, data type and length of the messages or the message elements may be ascertained by control unit 30 in a suitable manner known to one skilled in the art, for instance, by evaluating the header information having the necessary specification, which is attached to the messages or the message elements. The profile may also contain specifications specific to a terminal, which

may not be influenced by the user, and which specify the resources available to terminal 5, for instance, the graphics capability of an indicator device of terminal 5, the storage capacity of terminal 5 or the like as boundary conditions. However, it can also be provided that the user himself specifies which of the functionalities that can be implemented with terminal 5 are to be taken up into the profile. It is already known from the publication "Composite Capability/Preference Profiles (CC/PP): A User Side Framework for Content Negotiation", W3C Note, July 27, 1999, how a user can determine and change his profile.

Several such profiles can also exist, so as, for example, to give general consideration to capabilities of different indicator devices of terminal 5, or capabilities of different terminal configurations, which may result from the fact that external components such as their own indicator devices may be connected to terminal 5. Such an external component may be, for example, a laptop.

The settings for the current profile, as a rule, depend on the functionalities of terminal 5, which are currently available to the user. Even more than today, in the future a mobile user will be able to connect external equipment to his mobile terminal 5 developed, for instance, as a mobile phone or mobile radio, in order to vary, in such a manner, the implementable performance capabilities, using terminal 5, depending on need or what is offered. For reasons of mobility, size of the devices and stand-by time, many mobile radio devices will only offer basic functionalities, even in future. However, the user can broaden these functionalities, for example, by coupling an electronic notebook or an electronic organizer to mobile terminal 5.

If the user of terminal 5 wants to undertake changes in the current profile, the above-named publication "Composite Capability/Preference Profiles (CC/PP): A User Side Framework

for Content Negotiation" offers for this a bandwidth-efficient solution. Via telecommunications network 10, developed as a mobile radio network in this example, mobile terminal 5 transmits only the changes with respect to the previous profile to storage device 25, which is also denoted as profile database, and which can also be arranged outside matching device 15, in connection with it and assigned to it. However, storage device 25 can also be positioned in matching device 15, as shown in Figure 2. Thus, the complete current profile does not have to be transmitted. Nevertheless, when there is a change in the available functionalities of terminal 5, for example because of the connection of another device to terminal 5, at least the profile data changing in comparison to the previous profile must be transmitted to matching device 15.

According to the present invention, it is therefore proposed to permit the user of terminal 5 the use of several, or any number of different profiles. Depending on which external devices the user connects to his mobile terminal 5, that is, depending on which functionalities are currently available to him, he should then be able to select a suitable profile from a list of his profiles.

For this purpose, the list having the different profiles is stored in profile database 25. In each of these profiles, the user determines which functionalities are available to him and which properties the MMS service is to have with this profile.

The user can give each of these profiles a profile name that is as unique and as declarative as possible. In addition, between mobile terminal 5 and profile database 25, identifying characters, such as in the form of numbers, are agreed upon for each of these profiles, so that a definite map of an identifying character is possible for a profile name of each profile and thus for the content of the corresponding profile. A simple manner of agreeing on such identifying characters

between mobile terminal 5 and profile database 25 is, for example, to number them in the sequence in which they were stored in profile database 25. All the profiles input by the user of mobile terminal 5 are transmitted in an initializing phase from terminal 5 via telecommunications network 10 to matching device 15 or rather profile database 25 and stored in profile database 25, for instance, in the sequence of their arrival. Additional profiles defined and input by the user can also still be transmitted at a later point in time from terminal 5 to profile database 25, in the manner described, and can there be stored, for instance, in the sequence of their arrival.

Thus, for example, the user of a terminal 5 developed as a GSM mobile radio device can determine a first profile to which he gives the name "pure GSM (SMS only)". In this profile he will then determine that his GSM mobile radio device 5 only supports SMS, and that, therefore, he does not want e-mails present for him on an Internet e-mail server to be sent to him automatically, but in this case rather have them left on the Internet e-mail server. The same applies to other messages, different from SMS messages, present for the user, which he also wants to remain stored in the respective servers.

He can apply a second profile for the case in which he connects an electronic organizer to his GSM mobile radio device 5. On the organizer he now also has a calendar functionality which can access an organizer server, not shown in Figure 2, via mobile radio network 10 and MMS relay 15. In general, any desired number of servers or main stations, respectively, can be connected to matching device 15 in the manner described in Figure 2. In this case, the user can determine, in the second profile being marked, for instance, "GSM + organizer", to give an example, that not only SMS messages should be sent to him, but also that the user should automatically receive updates of his calendar, such as when his secretary or colleagues change, add or cancel an

appointment. Messages of other kinds, which are different from the message types named, should, according to the second profile, also remain stored on the associated swerver.

He can apply a third profile for the case in which he connects an electronic notepad to his GSM mobile radio device 5. On the electronic notebook he now has several possibilities or applications. Therefore, in the third profile, which he calls, for instance, "GSM + notebook", he sets the following: With mobile terminal 5 thus broadened, not only SMS and calendar functionalities can be implemented, but also, for example, e-mail and fax. Since, as a rule, only urgent and important information is sent to him by fax, but he gets all kinds of messages by e-mail, he determines, for instance, in profile 3 that messages in SMS, calendar and fax formats are to be automatically sent to him, but e-mails are to remain on the Internet e-mail server. Messages of other types, which differ from the types of messages named, should also remain stored on the assigned server.

In a fourth profile, the user of mobile terminal 5 will consider the case, for instance, that he is not traveling in his home network but is staying outside the country, for example. In such a case, the applicable roaming fees are too high, so that he may indeed wish to continue to receive SMS messages, but only wants to be informed by SMS concerning incoming calendar messages or faxes, without those being automatically delivered. E-mails and messages of other message types, which differ from the types of messages named, should also remain stored on their associated server.

When beginning to use SMS service, according to the present invention, the user needs further only to select that profile, on his list having profile names, which is stored in mobile terminal 5, and which corresponds to his wishes and the current functionalities of mobile terminal 5, or the additional current external devices or components that are

currently connected. In mobile terminal 5 this selection, this profile name is then mapped on the respective identifying character. This identifying character is then the only thing that has to be transmitted from mobile terminal 5 to MMS relay 15 via the air interface, or rather mobile radio network 10, in order to start MMS service as desired. Because, via this identifying character, MMS relay 15 can obtain the setting for the profile associated with the identifying character in profile database 25.

One advantage of the present invention is particularly that the user has to set the capabilities of his terminal 5, or its possible combination of devices in the form of external additional devices or components connected to terminal 5, and his desired configuration of the MSS servive, only one single time or can let MSS relay 15 set them at profile database 25. If there is a change in the device combination and/or in his wishes, he only has to select the matching profile from the list.

A further advantage results in each case from the identifying character of the profiles. As explained above, according to the present invention, it is not the information on the difference from the previous profile that has to be transmitted via the air interface, but only the identifying character of the desired profile. This saves data, and thus, resources on the mobile radio channel in mobile radio network 10, and speeds up the setting of the MMS service.

In MMS relay 15, data type conversions and/or data format conversions are also performed as described. In dependence upon the inputs of the user-defined profile or upon terminal-specific standard inputs, messages or message elements which are present in one of main stations 1, 2, 3 for terminal 5 in a first data type, such as a fax or as text, are changed to another data type, such as fax to graphic, or text to voice. Correspondingly, a message present in a first data

format may be converted by MMS relay 15 into a second data format. For example, a GIF graphic (graphic interchange format) may be converted into a JPEG graphic (joint picture expert group), or the text of a first alphabet may be converted into the text of a second alphabet.

It may be provided that MMS relay 15 notifies terminal 5 if new messages or message elements are not automatically passed on to terminal 5, for example, according to the pull mode. To this effect, notification of terminal 5 can be done by MMS relay 15 if messages or message elements, depending on the input of the profile or profiles, are automatically passed on to another mail system or are cancelled.

MM transfer protocol I between MMS relay 15 and MMS client must include, besides the functions for the transmission of a message from matching device 15 to terminal 5, three essential functional elements: 1.) the possibility of establishing a connection from MMS relay 15 to terminal 5, in order to implement the push mode. 2.) the possibility of establishing signaling from MMS relay 15 to terminal 5, in order to notify terminal 5 of a message present in one of main stations 1, 2, 3, in order to implement the pull mode. 3.) the possibility of establishing a connection from terminal 5 to MMS relay 15, in order to retrieve a message for terminal 5 stored in one of main stations 1, 2, 3, and thereby to complete the pull mode or to send messages.

The present invention is described below, in the light of three different embodiments. Starting from Figure 3, in Figure 4 layer sequences are shown for a concrete example in which the MMS server is designed as an Internet e-mail server, and represents first main station 1. MM transfer protocol II is here developed as SMTP or ESMTP. The SMTP or the ESMTP is superordinated to MM transfer protocol I in assignment to air interface U_u. The remaining layers correspond to the layers already shown in Figure 3. Terminal 5 is an SMTP-capable or an

ESMTP-capable terminal. In the case of the Internet e-mail server shown in Figure 4, an Internet e-mail POP (post office protocol) server is involved. The MMS client according to Figure 4 is developed in this example as an SMTP client, i.e. an SMTP-capable terminal 5. The connection from MMS relay 15 to the Internet e-mail POP server is identical to a classical Internet e-mail configuration, in which a POP server stores all e-mails coming in for POP client, and which checks POP client in regular cycles to see whether new mail has come in for it on the POP server. If so, they are loaded in their entirety into POP client, in classical Internet e-mail configuration no MMS relay 15 being provided. The SMTP is provided as transmission protocol which, as described, uses the TCP/IP (transmission control protocol/Internet protocol), at least for the IP interface.

In the first embodiment according to Figure 4, MMS relay 15 includes, for the IP interface, the described POP client functionality according to the classical Internet e-mail configuration. A new e-mail on the Internet e-mail POP server is thus transmitted to MMS relay 15 in the manner described for the classical POP client. MMS relay 15 then determines, in dependence upon the profile entries stored in storage device 25, whether this e-mail, or which elements of this e-mail are forwarded directly to terminal 5 using push mode, and signals to terminal 5, perhaps additionally, that there are present still further elements of this message for transmission to terminal 5 in pull mode, or that these are passed on to another mail system or are cancelled. If no element of the e-mail is transmitted to terminal 5 in push mode, only one notification takes place in one of the forms described. For example, the e-mail should now contain elements for both transmission modes, that is, for push mode and pull mode. Hereby MMS relay 15 combines the elements, provided for the push mode according to the profile, into a new message, establishes a transmission channel to terminal 5 and sends these combined elements using SMTP. The other elements are

also combined and sent via SMTP to the Internet e-mail server, so as to be passed on from there to another mail system, to be cancelled, or to be stored for the pull mode until retrieved by terminal 5. The notification on the presence of message elements provided for the pull mode can take place together with the transmission of the combined message elements in push mode or separately. If only one notification takes place, i.e. if no message elements are present which must be transmitted to terminal 5 in push mode, this notification could take place using a message generated by MMS relay 15, which is transmitted to terminal 5 in push mode or uses special signalling channels, such as the SMS service according to the GSM standard.

If terminal 5 cannot be reached via communications network 10, those message elements are also stored, for example, in storage device 25 of MMS relay 15, which are to be transmitted to terminal 5 in push mode. Correspondingly, notifications are stored intermediately in storage device 25 of MMS relay 15, which have to be transmitted by MMS relay 15 to terminal 5 with respect to message elements that are not to be transmitted in push mode. The storage of the message elements which are to be transmitted in push mode and/or of the notifications continues until MMS relay 15 is notified, for example, by the HLR that terminal 5 can now be reached via telecommunications network 10. Thereafter, transmission of message elements in push mode or of notifications to terminal 5 is continued. The storage of message elements and/or notifications can take place in this example in the Internet e-mail server or in MMS relay 15.

Besides the transmission modes, the profile regulates, for instance, conversions of data formats of messages, as was described. If terminal 5 supports only the JPEG data format in the case of graphics, this is entered in the profile according to the standard, and MMS relay 15 automatically converts all graphics message elements received for terminal 5 to JPEG

format.

According to the first embodiment, POP is used as an example. Alternatively, the IMAP (Internet message access protocol) or other protocols available for this purpose could also be used.

Starting from the first embodiment as in Figure 4, Figure 5 shows a second embodiment in which the MMS server and MMS relay 15 are functionally combined, which can be advantageous for network-internal services, such as voice mail/fax. In this connection, Figure 5 shows the protocol layer sequence of the MMS client, known from Figure 4, as in Figure 4, and the first protocol layer sequence 35 for air interface U_u of MMS relay 15 as in Figure 4. This protocol layer sequence is now shared by MMS relay 15 and the MMS server in a common physical unit as in Figure 5.

In Figure 6 too, the MMS server and MMS relay 15 are combined functionally into a physical unit, however, rather for IP-based implementation. In this context, the MMS server as in Figure 6 corresponds in its protocol layer sequence to the Internet e-mail server as in Figure 4. This protocol layer sequence is shared by the MMS server and MMS relay 15. The same protocol layer sequence is then, as usual, selected for the MMS client as in Figure 6, air interface U_u representing at the same time an IP interface between the MMS client and MMS relay 15 or the MMS server.

In this connection, Figure 6 shows a third embodiment. All three embodiments, as in Figure 4, Figure 5 and Figure 6 may be used in common in MMSE.

Common to all implementations is the uniform service functionality from the point of view of the MMS client, which is ensured by MMS relay 15, MMS relay 15 being developed either as a separate protocol element or as being functionally integrated with the MMS server.

Not only one, but several terminals may be connected to fourth interface 20 in the manner described, so that MMS relay 15 may be used in the manner decribed for several terminals at the same time, at least one profile of each of the connected terminals may be stored in storage device 25 in the manner described.